DETAILED ACTION

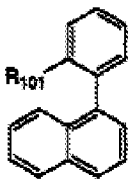
1. This Office action is in response to the amendment filed December 19, 2009, which amends claims 1 and 2. Claims 1-9 are pending. Claims 3-7 are withdrawn from consideration.

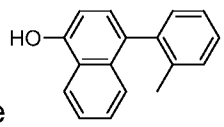
Response to Arguments

2. Applicant's arguments filed December 19, 2009 have been fully considered but they are not persuasive.

3. Regarding applicant's arguments that Bryan et al. (US 5141671) (hereafter "Bryan") in view of Kita et al. (EP 1013740) (hereafter "Kita") and Higashi et al. (WO 2000/41443) where Higashi et al. (US 6617051) (hereafter "Higashi") is used as the English equivalent and Kita et al. (EP 1013740) (hereafter "Kita") in view of Bryan et al. (US 5141671) (hereafter "Bryan") and Higashi et al. (WO 2000/41443) where Higashi et al. (US 6617051) (hereafter "Higashi") is used as the English equivalent does not teach the limitation so the amended claims. The amendment required a reinterpretation of the prior art and still applies for the following reason, Bryan teaches aluminum chelate complexes (column 5 formula (III), column 9 PC-7, column 11 PC-17) that can be used in an organic EL device (column 2 lines 58-63). Bryan does teach in formula (II) (column 5 lines 13-30) the phenolate group can contain substituents and the substituents can come together to form an aromatic ring (forming a naphthyl group, PC-17) and this group can be further substituted and teaches phenyl as a substituent for the arylene group (PC-7). Bryan teaches that the complexes, such as PC-7, are

synthesized without the use of any materials that contain a halogen atom (column 21 lines 19-45). Since this procedure does not use any materials that have a halogen atom, the complexes the meet the limitations of formula (2) would not be present; therefore, the ppm for the compound would be zero. Bryan further teaches the purification of the aluminum chelate complexes by using sublimation to further purify the compounds synthesized (column 23 Table II). Bryan teaches the phenolate complex shifts the emission properties of the aluminum chelate complex (column 3 liens 59-64).

4. Kita teaches an aluminum chelate complex (Page 31, compound E-12) that can be used in an organic electroluminescent device (paragraphs [0014], [0017], and [0022], formula E-1). Kita teaches that compound represented by R_{71} can be a biaryl group having a bonding axis capable of giving an internal rotational isomerism that, which can have the following structure 

where R_{101} can be an alkyl group , and this ligands furthers contains an OH group which is used to bind to M in the formula (paragraphs [0032], [0033], and [0037]). Kita teaches the use of the aluminum chelate complex as a light emitting material (paragraph [0159]). Kita teaches the aluminum chelate complex can be used to provide an electroluminescent element capable of emitting high luminance light and has high storage ability (paragraph [0013]). This teaching by Kita allows compounds with the following structure 

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5. Higashi teaches that the presence of halogen impurities in organic materials used in the organic compound layers of an organic EL device will attenuate emission luminance and short emission layer in organic EL devices (column 29 lines 41-67 and column 30 lines 1-18).

6. Given the teachings of Bryan, Kita, and Higashi, it would have been obvious of one of ordinary skill in the art the time the invention was made to make a an aluminum chelate complex that reads on applicant's formula (1), where Ar_1 is naphthyl and Ar_2 is phenyl and have impurities of less than 350 wt ppm of a compound presented by general formula (2). Bryan teaches aluminum chelate compounds that contain naphthyl groups and teaches that the compounds can be made without using a compound that has a halogen atom. Furthermore, Bryan teaches the purification of these compounds by sublimation, which is the same purification process used by the applicants; therefore, the amount of halide compound if present would be less than 350 wt ppm. Also, Higashi teaches the halogen impurities attenuate emission luminance; therefore, one skilled in the art would remove as much of the halogen impurities if present. This would lead to one of ordinary skill in the art removing the amount of halogen compound present to be 350 wt ppm or less.

Claim Rejections - 35 USC § 112

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

8. Claims 1, 2, 8, and 9 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

9. Regarding claim 1, the applicant claims that Ar_1 is a bicyclic arylene group and Ar_1 is a monocyclic aryl group and the total number of aromatic rings in Ar_1 and Ar_2 is 3 or 4, but when Ar_1 is a bicyclic arylene group and Ar_1 is a monocyclic aryl group the total number of aromatic rings in Ar_1 and Ar_2 can be 3 and cannot be 4.

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

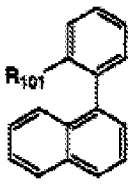
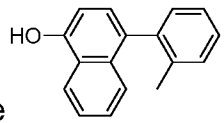
12. Claims 1, 2, and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bryan et al. (US 5141671) (hereafter “Bryan”) in view of Kita et al. (EP 1013740)

(hereafter "Kita") and Higashi et al. (WO 2000/41443) where Higashi et al. (US 6617051) (hereafter "Higashi") is used as the English equivalent.

13. Regarding claims 1 and 2, Bryan teaches aluminum chelate complexes (column 5 formula (III), column 9 PC-7, column 11 PC-17) that can be used in an organic EL device (column 2 lines 58-63). Bryan does teach in formula (II) (column 5 lines 13-30) the phenolate group can contain substituents and the substituents can come together to form an aromatic ring (forming a naphthyl group, PC-17) and this group can be further substituted and teaches phenyl as a substituent for the arylene group (PC-7). Bryan teaches that the complexes, such as PC-7, are synthesized without the use of any materials that contain a halogen atom (column 21 lines 19-45). Since this procedure does not use any materials that have a halogen atom, the complexes the meet the limitations of formula (2) would not be present; therefore, the ppm for the compound would be zero. Bryan further teaches the purification of the aluminum chelate complexes by using sublimation to further purify the compounds synthesized (column 23 lines 23 Table II). Bryan teaches the phenolate complex shifts the emission properties of the aluminum chelate complex (column 3 liens 59-64).

14. Bryan does not teach an aluminum chelate complex the meets the limitations of formula (1) in claim 1.

15. Kita teaches an aluminum chelate complex (Page 31, compound E-12) that can be used in an organic electroluminescent device (paragraphs [0014], [0017], and [0022], formula E-1). Kita teaches that compound represented by R_{71} can be a biaryl group having a bonding axis capable of giving an internal rotational isomerism that, which can

have the following structure  where R_{101} can be an alkyl group , and this ligands furthers contains an OH group which is used to bind to M in the formula (paragraphs [0032], [0033], and [0037]). Kita teaches the use of the aluminum chelate complex as a light emitting material (paragraph [0159]). Kita teaches the aluminum chelate complex can be used to provide an electroluminescent element capable of emitting high luminance light and has high storage ability (paragraph [0013]). This teaching by Kita allows compounds with the following structure  .

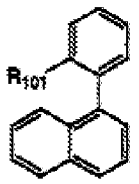
16. Higashi teaches that the presence of halogen impurities in organic materials used in the organic compound layers of an organic EL device will attenuate emission luminance and short emission layer in organic EL devices (column 29 lines 41-67 and column 30 lines 1-18).

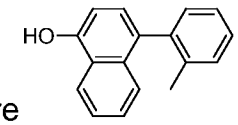
17. Given the teachings of Bryan, Kita, and Higashi, it would have been obvious of one of ordinary skill in the art the time the invention was made to make a an aluminum chelate complex that reads on applicant's formula (1), where Ar_1 is naphthyl and Ar_2 is phenyl and have impurities of less than 350 wt ppm of a compound presented by general formula (2). Bryan teaches aluminum chelate compounds that contain naphthyl groups and teaches that the compounds can be made without using a compound that has a halogen atom. Kita teaches aluminum chelate compounds that can contain naphthyl groups and phenyl groups, but does not specifically teach the compound.

Bryan teaches the use synthesis of the aluminum chelate ligands without the use of compounds having halogen atoms. Furthermore, Bryan teaches the purification of these compounds by sublimation, which is the same purification process used by the applicants; therefore, the amount of halide compound if present would be less than 350 wt ppm. Also, Higashi teaches the halogen impurities attenuate emission luminance; therefore, one skilled in the art would remove as much of the halogen impurities if present. This would lead to one of ordinary skill in the art removing the amount of halogen compound present to be 350 wt ppm or less. The motivation would have been to avoid the presence of halogen containing impurities because halogen containing impurities are known to attenuate emission luminance and short emission layer in organic EL devices.

18. Regarding claim 9, Bryan teaches that the purity of the compounds can be improve during the production of the compounds by using sublimation (column 22 liens 40-53, Table II); therefore, incorporating a quality control practice during the production of the aluminum chelate complexes. Since Bryan synthesis does not include the use of materials that contain a halogen group the amount of the impurity would be 0 ppm.

19. Claims 1, 2, and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kita et al. (EP 1013740) (hereafter “Kita”) in view of Bryan et al. (US 5141671) (hereafter “Bryan”) and Higashi et al. (WO 2000/41443) where Higashi et al. (US 6617051) (hereafter “Higashi”) is used as the English equivalent.

20. Regarding claims 1 and 2, Kita teaches an aluminum chelate complex (Page 31, compound E-12) that can be used in an organic electroluminescent device (paragraphs [0014], [0017], and [0022], formula E-1). Kita teaches that compound represented by R_{71} can be a biaryl group having a bonding axis capable of giving an internal rotational isomerism that, which can have the following structure 

where R_{101} can be an alkyl group , and this ligands furthers contains an OH group which is used to bind to M in the formula (paragraphs [0032], [0033], and [0037]). Kita teaches the use of the aluminum chelate complex as a light emitting material (paragraph [0159]). Kita teaches the aluminum chelate complex can be used to provide an electroluminescent element capable of emitting high luminance light and has high storage ability (paragraph [0013]). This teaching by Kita allows compounds with the following structure 

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21. Kita does not teach how the aluminum chelate complex is synthesis and if there is an impurity corresponding to formula (2) is present.

22. Bryan teaches aluminum chelate complexes (column 5 formula (III), column 9 PC-7, column 11 PC-17) that can be used in an organic EL device (column 2 lines 58-63). Bryan teaches that the complexes, such as PC-7, are synthesized without the use of any materials that contain a halogen atom (column 21 lines 19-45). Since this procedure does not use any materials that have a halogen atom, the complexes the meet the limitations of formula (2) would not be present, or be 0 ppm. Bryan further

teaches the purification of the aluminum chelate complexes by using sublimation (column 23 Table II), which is the same method used by the applicant; therefore, the amount of halogen impurity if present would be 350 ppm or less. The complexes taught by Bryan do not meet the limitations of the formula (1) in claim 1, but does teach in formula (II) (column 5 lines 13-30) the phenolate group can contain substituents and the substituents can come together to form an aromatic ring (forming a naphthyl group, PC-17) and this group can be further substituted and teaches phenyl as a substituent for the arylene group (PC-7). Bryan teaches the phenolate complex shifts the emission properties of the aluminum chelate complex (column 3 liens 59-64).

23. Higashi teaches that the presence of halogen impurities in organic materials used in the organic compound layers of an organic EL device will attenuate emission luminance and short emission layer in organic EL devices (column 29 lines 41-67 and column 30 lines 1-18).

24. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the synthesis method taught by Bryan to make the aluminum chelate complex taught by Kita. One would use the method taught by Bryan because the method does not include the use of materials that contain halogen atoms and thus would avoid the presence of compounds containing halogens as impurities. One would avoid halogen containing impurities because it was shown by Higashi that the presence of halogen containing impurities attenuate emission luminance and short emission layer in organic EL devices.

25. Regarding claim 9, Kita does not teach the use of quality control to determine the amount of impurities in the compound during production, shipping, or use.

26. Bryan teaches that the purity of the compounds can be improved during the production of the compounds by using sublimation (column 22 liens 40-53, Table II). Bryan teaches the aluminum chelate complexes are suited for use in EL devices due to the complexes stability and efficiency (column 2 lines 58-63).

27. Higashi teaches the purity of the compounds can be checked during the production of the desired compound to make sure no halogen containing compounds are present or are limited (column 39 lines 21-48). Higashi teaches that the presence of halogen impurities in organic materials used in the organic compound layers of an organic EL device will attenuate emission luminance and short emission layer in organic EL devices (column 29 lines 41-67 and column 30 lines 1-18).

28. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify production of the aluminum chelate complex taught by Kita to include an exercise of quality control during the production of the aluminum chelate complex to insure the lack of impurities especially halogen containing impurities. The motivation would have been to produce pure aluminum chelate compounds that are suitable fore EL devices and make the halogen containing impurities are not present since they are known to attenuate emission luminance and short emission layer in organic EL devices. Also, since the method of Bryan does not include the use of materials that contain a halogen group the amount of the impurity would be 0 ppm.

29. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bryan et al. (US 5141671) (hereafter "Bryan") in view of Kita et al. (EP 1013740) (hereafter "Kita") and Higashi et al. (WO 2000/41443) where Higashi et al. (US 6617051) (hereafter "Higashi") is used as the English equivalent or Kita et al. (EP 1013740) (hereafter "Kita") in view of Bryan et al. (US 5141671) (hereafter "Bryan") and Higashi et al. (WO 2000/41443) where Higashi et al. (US 6617051) (hereafter "Higashi") is used as the English equivalent as applied to claims 1, 2, and 9 above, and further in view of Tsuji et al. (US 2003/0129452) (hereafter "Tsuji").

30. Regarding claim 8, Bryan in view of Kita and Higashi and Kita in view of Bryan and Higashi teaches the use of the aluminum chelate complexes as a light emitting material (see above).

31. Bryan in view of Kita and Higashi and Kita in view of Bryan and Higashi does not teach the aluminum chelate complex host material for a phosphorescent dopant in an electroluminescent device.

32. Tsuji teaches an organic electroluminescent element (abstract) that contains an aluminum chelate complex as a host material (formula (A), paragraphs [0039]-[0046]). These aluminum chelate complexes overlap with the aluminum chelate complexes taught by Bryan. Tsuji further teaches that the aluminum chelate complexes are host materials for phosphorescent materials and the phosphorescent materials are organic complexes containing platinum or iridium (paragraph [0048]). Tsuji teaches that phosphorescent materials are more efficient than fluorescent materials and produce EL

elements that have higher light efficiency than those that contain fluorescence compounds (paragraph [0007]).

33. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify to the EL device of Bryan in view of Kita and Higashi and Kita in view of Bryan and Higashi, to use the aluminum chelate complex as a host material for a phosphorescent organic complex containing a noble metal as the dopant. The motivation would have been to produce an EL element having a higher light efficiency that those that only contain the aluminum chelate complex as the fluorescent material.

Conclusion

34. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

35. A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

36. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrew K. Bohaty whose telephone number is (571)270-1148. The examiner can normally be reached on Monday through Thursday 7:30 am to 5:00 pm EST and every other Friday from 7:30 am to 4 pm EST.

37. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, D. Lawrence Tarazano can be reached on (571)272-1515. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

38. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/A. K. B./
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/D. Lawrence Tarazano/
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